REMARKS

In the Office Action dated October 4, 2007, typographical errors in claims 8 and 14 were noted, which have been corrected.

An editorial change also has been made in the present specification.

Claims 1 and 2 were rejected under 35 U.S.C. §103(a) as being unpatentable over Bradley et al. in view of Baekgaard. Claims 3-7 were rejected under 35 U.S.C. §103(a) as being unpatentable over Bradley et al. in view of Baekgaard, further in view of Baumhauer Jr. et al. Claims 8-10 were rejected under 35 U.S.C. §103(a) as being unpatentable over Bradley et al. in view of Baekgaard, further in view of Hagen et al. Claim 11 was rejected under 35 U.S.C. §103(a) as being unpatentable over Bradley et al. in view of Baekgaard, further in view of Allred et al. Claims 12 and 13 were rejected under 35 U.S.C. §103(a) as being unpatentable over Bradley et al. in view of Baekgaard, further in view of Baumhauer Jr. et al. Claim 14 was rejected under 35 U.S.C. §103(a) as being unpatentable over Bradley et al. in view of Baumhauer Jr. et al., further in view of Baekgaard.

These rejections are respectfully traversed for the following reasons.

As explained in the introductory portion of the present specification, a directional microphone system can be formed by combining several omnidirectional microphones. In order to obtain good directionality for a directional microphone system that is formed in this manner, it is necessary for all of the omnidirectional microphones in the directional microphone system to be matched to each other in terms of amplitude and phase, namely all of the omnidirectional microphones should have the same (equalized) amplitude and phase characteristics.

Amplitude matching is relatively easy to accomplish, but phase matching, done in the conventional manner, is complicated because it has been conventionally necessary to measure phase shifts, and undertaking a phase shift measurement is considerably more difficult than making an amplitude measurement.

In accordance with the present invention, the procedure for equalizing the phase and amplitude characteristics of omnidirectional microphones that are being combined to form a directional microphone system is simplified, by undertaking the necessary phase and amplitude equalization in two separate steps. In the first step, the amplitudes of the omnidirectional microphones are matched (equalized). In a second step, pairs of the omnidirectional microphones are combined to form respective microphones of the first order, and the amplitudes of these microphones of the first order are matched (equalized) only by phase shifting the respective signals from the omnidirectional microphones. There is no gain adjustment or gain variation that takes place in this step. This phase shifting does not require an actual measurement of a phase difference or phase offset between the two microphones in a pair; the matching by phase shifting can again be undertaken by level detection (amplitude measurement), just as in the first step. Only amplitude differences must be detected, which can be easily accomplished.

This procedure functions only with microphone systems of respectively different orders. In the first step, the amplitudes of signals from microphones of a lower order (for example, zero order, i.e., omnidirectional microphones) are matched (equalized), and subsequently the amplitudes of microphone systems of a higher order (for example, first order) are matched by phase shifting the microphone signals

of that higher order, with the microphones of that higher order being formed by the previously-matched microphones of the lower order.

Applicant acknowledges that the Bradley et al. reference discloses a hearing aid having a directional microphone system. There is no disclosure or teaching in the Bradley et al. reference as to a procedure for equalizing unbalanced microphones in the directional microphone system.

The Baekgaard reference discloses a method for adaptive matching of microphones that are to be used in a hearing aid. The Baekgaard reference does make use of a two step process, but in the procedure disclosed in the Baekgaard reference, an adaptive sensitivity (i.e., amplitude) matching circuit is used together with an adaptive phase matching circuit in order to respectively adjust the amplitude and the phase. Phase matching can be achieved after sensitivity matching, or sensitivity matching can be achieved after phase matching, which means that the matching that is done first can affect the matching that is subsequently done.

The Baekgaard reference, therefore, does not disclose or suggest the aforementioned procedure for phase matching that is disclosed and claimed in the present application. The inventive method makes phase matching as easy as amplitude matching, but this procedure, and the microphone systems and hearing aids that operate according to that procedure, require the use of microphone systems of different orders. At least three omnidirectional microphones are necessary for forming two microphone systems of the first order. The Baekgaard reference does not describe any details regarding the algorithm of the adaptive phase matching circuit that is used, but in all of the examples disclosed in the Baekgaard reference, hearing aids are described that are formed by only two

omnidirectional microphones. With a hearing aid having only two omnidirectional microphones, it is not possible to combine those microphones in pairs so as to form two microphones of the first order. Since microphone systems of the different orders that are claimed in all of the independent claims of the present application cannot even be built according to the disclosure of Baekgaard, the phase matching algorithm used therein (whatever it is) cannot be comparable to the subject matter of the independent claims of the present application.

Although the above discussion has been primarily concerned with independent method claim 1, that procedure is claimed, in functional terms, in each of the further independent claims 12 and 14, and therefore the above discussion concerning Bradley et al. and Baekgaard is equally applicable to those other independent claims.

The above discussion is therefore applicable to all of the rejections that were made in the Office Action, since Bradley et al. and Baekgaard were used as the primary basis for all of those rejections. With regard to claim 14, although the Examiner stated the formulation of that rejection as being Bradley et al. in view of Baumhauer Jr. et al., further in view of Baekgaard, the basic argumentation of the Examiner with regard to Bradley et al. and Baekgaard in substantiating that rejection was the same as with regard to Bradley et al. and Baekgaard alone, with respect to method claim 1.

Therefore, even if the Examiner's statements regarding the teachings of the various secondary references are correct, modifying the Bradley et al./ Baekgaard combination in accordance with those further teachings still would not result in any of

the dependent claims of the application, nor any of the other independent claims of the application.

All claims of the application are therefore submitted to be in condition for allowance, and early reconsideration of the application is respectfully requested.

The Commissioner is hereby authorized to charge any additional fees which may be required, or to credit any overpayment to account No. 501519.

Submitted by,

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